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ANNUAL REPORT 1964

BERTIE

water treatment plant

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DIVISION OF PLANT OPERATIONS

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Bertie : water treatment plant.
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ONTARIO WATER RESOURCES COMMISSION
OFFICE OF THE GENERAL MANAGER

Members of the Bertie Local Advisory Committee,
Township of Bertie.

Gentlemen:

We are pleased to provide you with the 1964 Operating Report for the Bertie Water Treatment Plant, OWRC Project No. 59-W-47.

By continuing the mutual cooperation which has existed in the past, we can look forward to greater progress in the field of water supply.

Yours very truly,

D. S. Caverly,
General Manager

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General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Township of Bertie Water Treatment Plant, OWRC Project No. ~~49~~59-W-47 for 1964.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

BCPalmer

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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FOREWORD

This report describes the operation of this project for the year 1964. It includes a detailed description of the project, summary of operation, graphs and charts showing quality and quantity information, and project cost data.

This information will be of value to the municipality in assessing the adequacy of the works in meeting existing requirements and in projecting its capability to meet future expected demands. The cost information will be of particular interest to those concerned with developing and maintaining revenue structures.

The preparation of this report has been a cooperative effort of several groups within the Division of Plant Operations. These include the Statistical Section, Brochures Officer and the Regional Supervisor. However, the primary responsibility for the content has been with the Regional Operations Engineer. He will be pleased to discuss all aspects of this report with the municipality.

B. C. Palmer, P. Eng.,
Director,
Division of Plant Operations.

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BERTIE

water treatment plant

operated for

THE TOWNSHIP OF BERTIE

by the

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Assistant Director: C. W. Perry
Regional Supervisor: A. Beattie
Operations Engineer: P. J. Osmond

801 Bay Street Toronto 5

'64 REVIEW

The Township of Bertie Water Treatment Plant processed a total of 381.524 million gallons of water during 1964. The daily flow varied between 0.473 million gallons in January and 2.864 million gallons in July.

During 1964 the plant continued to supply a good quality water at a reasonable cost. The operating costs for the year averaged $105.95 per million gallons.

Supervision and technical assistance by head office engineers and technicians together with the excellent work of the plant staff resulted in a well operated and maintained plant throughout the year.

GLOSSARY

BTU	British Thermal Unit
flocculation	bringing very small particles together to form a larger mass (the floc) before settling
fps	feet per second
gpm	gallons per minute
lin. ft.	linear feet
mgd	million gallons per day
pH	a symbol for hydrogen-ion concentration; a pH test determines the intensity of the acidity or alkalinity of a water
ppm	parts per million
ss	suspended solids
SWD	side wall depth
TDH	total dynamic head (usually refers to pressure on a pump when it is in operation)
turbidity	a measurement of the amount of visible material in suspension in water

HISTORY

1958 – 1964

INCEPTION

In 1958 the Township of Bertie approached the Ontario Water Resources Commission to undertake the design, financing, construction and operation of a water intake, treatment plant and water distribution system.

The firm of Canadian British Engineering Consultants, Toronto, Ontario, was engaged to prepare plans and specifications for the project.

CONSTRUCTION

Construction began in October 1960. Schwenger Construction Company Limited, Burlington, constructed the treatment plant and ancillary site works. Dravo of Canada Limited, Toronto, constructed the intake and N. J. Storm Limited, Fort Erie the water distribution main. In July 1961, the Division of Plant Operations of the Ontario Water Resources Commission began the operation of the project.

TOTAL COST

$763,735

WILF VYE
CHIEF OPERATOR

Project Staff

Operators

J. Huffman	J. Donnelly
E. York	C. Birley

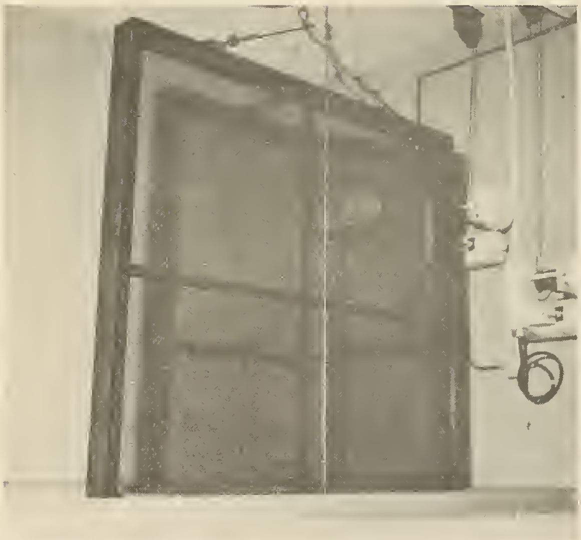
Casual: A. Hallman

COMMENTS

As shown above, the total staff consists of five regular staff and one casual. There is a twenty-four hour supervision of the plant.

The casual operator is used to cover one eight hour period during the week. He is also available to provide vacation relief to the regular members of the staff.

Description of Project



REMOVEABLE SCREEN
AT ENTRANCE TO LOW LIFT PUMP WELL

INTAKE WORKS

The intake crib is located 1800 feet out in Lake Erie in approximately seventeen feet of water. The raw water flows by gravity through a 42 inch diameter corrugated iron pipe laid in a rock cut to the low lift station pump wells.

LOW LIFT STATION

There are two pump wells. Each pump well has a pair of five foot square screens which can be removed separately for cleaning. The screens prevent the entry of debris which might damage the low lift pumps.

The raw water is pumped from the wells

to the microstrainer by three vertical turbine pumps, two of which are located in the east well and one in the west well, with provision for an additional pump in the future.

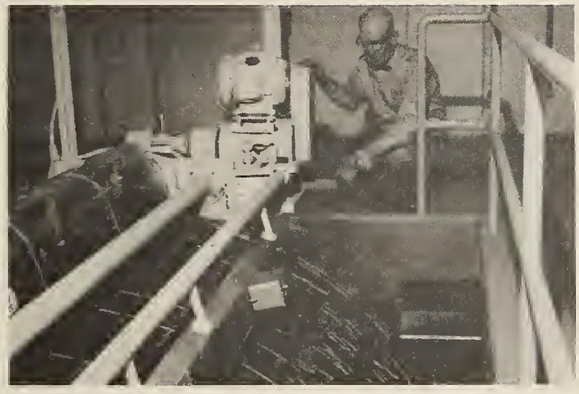
The pumps are controlled by electrodes located in the clear well of the high lift station. A low level in the clear well indicates a demand for water.

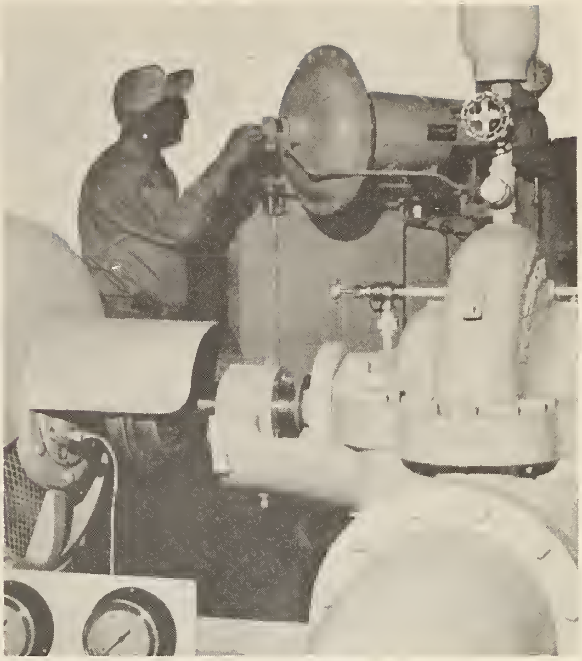
MICROSTRAINER

Upon reaching the high lift station, the raw water passes through a microstrainer. A microstrainer consists of a revolving drum the circumference of which is covered with an extremely fine woven stainless steel cloth. The microstrainer removes most of the algae and other foreign material from the raw water as it passes through the fabric from the inside of the drum to the outside. The strained water then overflows from the microstrainer compartment into an effluent channel which flows into the clear wells. The microstrainer fabric is continually flushed by treated water when in operation and the waste deposits are removed by means of the hollow centre shaft of the unit. Over a period of months accumulations of algae on the fabric which cannot be flushed away must be removed by taking the machine out of service and cleaning with a strong chemical solution.

CHLORINATION

The effluent from the microstrainer is stored in two clear wells located directly beneath the high lift pumping station. It is here that chlorine is added for disinfection. The chlorine is fed through proportional feed chlorinators the amount being determined by the rate of flow of raw water from the low lift station. Enough chlorine is added to maintain a slight residual in the water when it reaches the consumers outlets.


MICROSTRAINER


WILF VYE ADJUSTS HIGH LIFT PUMP

The chlorine equipment is installed in an isolated room in the high lift pumping station with the chlorine being stored in one hundred and fifty pound cylinders.

DISTRIBUTION

Treated water is drawn from the clear wells and distributed to Bertie Township by four high lift pumps. The downstream pressure is controlled by a butterfly valve operating off a pressure switch. Leaving the plant is a fourteen inch main running north on Rosehill Road to Garrison Road and a twelve inch main running east on Garrison Road from Rosehill Road to Separs Road.

FLOW MEASUREMENT

One 24 inch diameter Dall tube.

PROJECT COSTS

LONG TERM DEBT: (Total Capital Cost)	$763,735.00

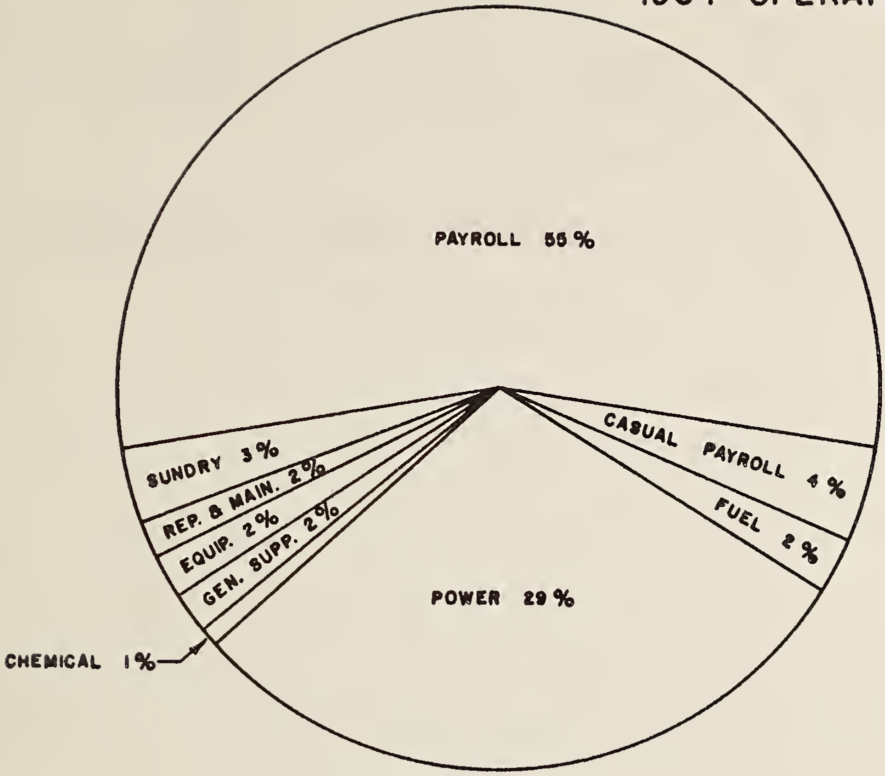
The total cost to the municipality during 1964 was as follows:

Net Operating	$ 40,425.88
Debt Retirement	15,412.00
Reserve	5,563.00
Interest Charged	42,967.97
TOTAL	$104,368.85

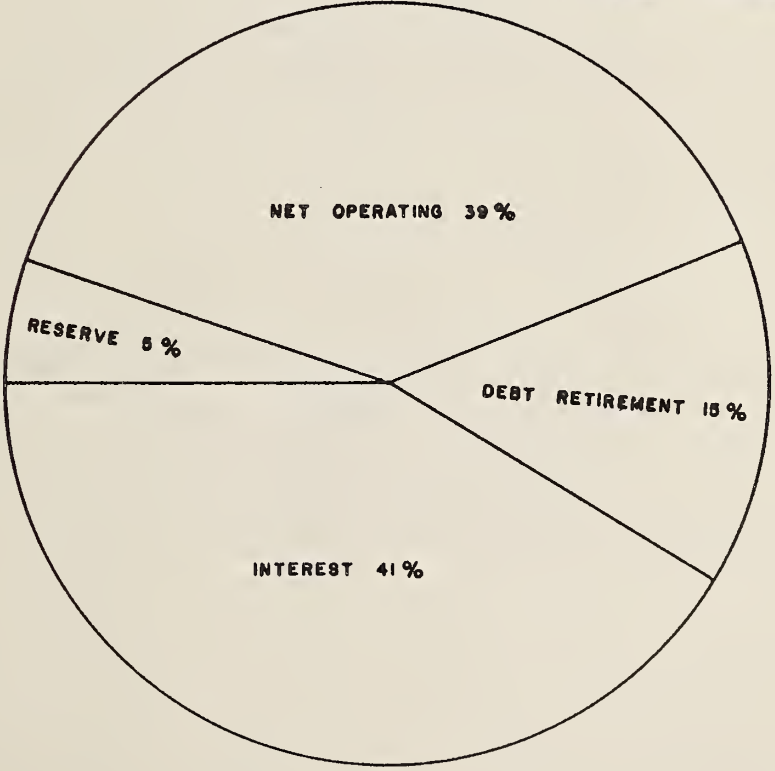
RESERVE ACCOUNT

Balance at January 1, 1964	$ 14,265.98
Deposited by municipality	5,563.00
Interest Earned	903.43
	$ 20,732.41
Less Expenditures	-
Balance at December 31, 1964	$ 20,732.41

DEBT OUTSTANDING:	$706,073.73



1964 OPERATING COSTS



TOTAL ANNUAL COST

MONTHLY COSTS

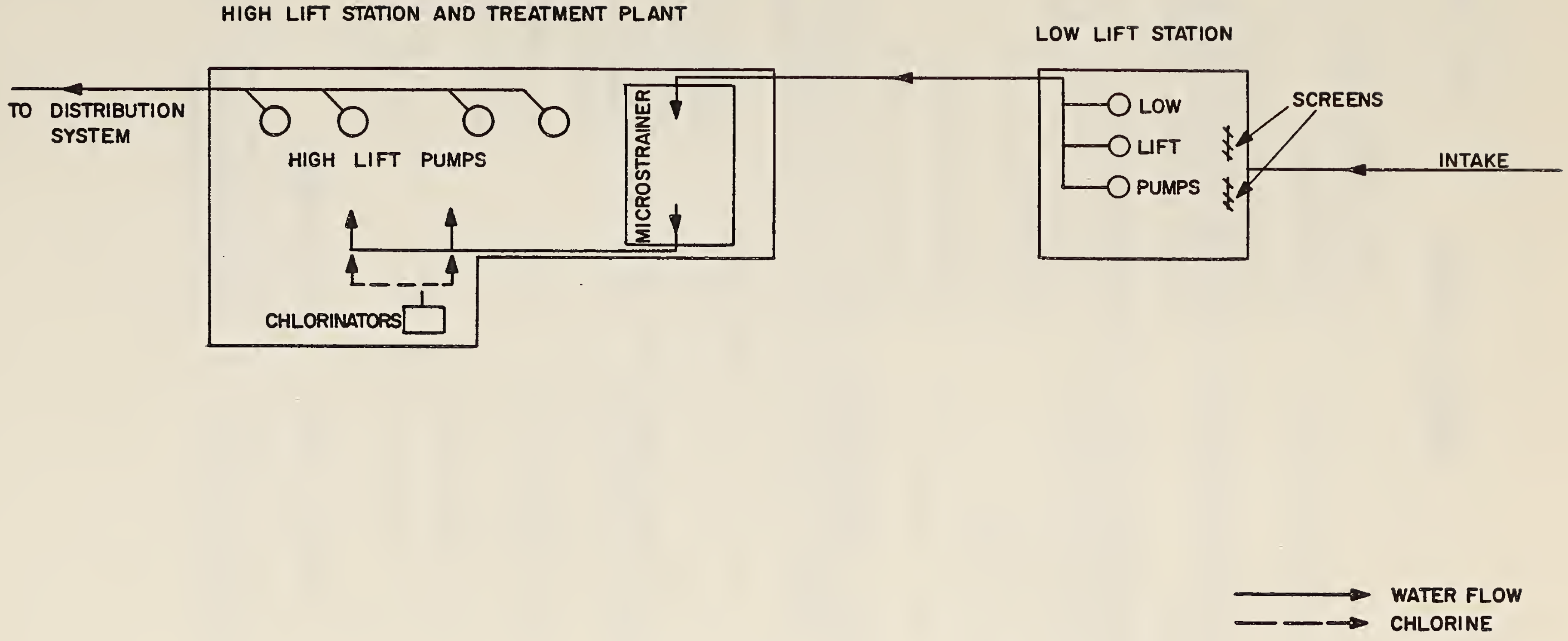
MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY
JAN	2082.31	1639.30	30.06	118.78			61.54	198.38	-	34.25
FEB	2891.44	1639.30	45.06	166.18	915.67		67.65	27.83	-	29.75
MARCH	3018.76	1827.07	75.16	147.58	915.41	(105.00)	23.82	-	-	134.72
APRIL	3468.68	1704.06	105.08	133.18	969.83	320.75	87.88	95.43	11.27	41.20
MAY	3989.85	2556.09	150.06	113.58	915.41	-	26.39	164.57	-	63.75
JUNE	3154.54	1916.45	163.88	66.18	902.80	-	76.68	-	-	28.55
JULY	3350.26	1704.06	247.86	18.98	934.88	333.75	71.93	-	-	38.80
AUG	3297.69	1704.06	210.08	6.08	1254.70	(10.00)	27.11	72.46	-	33.20
SEPT	3482.91	1704.06	75.22	4.38	1248.06	(210.00)	-	102.16	-	559.03
OCT	3507.98	1704.06	120.04	5.98	1001.81	2.50	110.71	-	442.26	120.62
NOV	3014.50	1704.06	210.00	27.98	1001.47	-	21.23	-	32.76	17.00
DEC	5166.96	2556.09	165.10	178.36	1860.74	(23.12)	97.28	54.31	148.31	129.89
TOTAL	40425.88	22358.66	1597.60	987.24	11920.78	308.88	672.22	715.14	634.60	1230.76

BRACKETS INDICATE CREDIT

YEARLY COSTS

YEAR	M.G. TREATED	TOTAL COST	COST PER FAMILY PER YEAR	COST PER MILLION GALLONS
1963	387.069	38,040.12		98.30
1964	381.524	40,425.88		105.95

Technical Section



FLOW DIAGRAM

BERTIE TOWNSHIP WATER TREATMENT PLANT

Design-Data

UNITS

All capacities listed in Imperial Gallons.

INTAKE

Eighteen hundred feet of 42 inch diameter corrugated metal pipe.

Seven foot diameter corrugated metal bellmouth intake inside a fifteen foot square timber crib located in approximately seventeen feet of water.

LOW LIFT PUMPING STATION

Two pump wells, each 13' x 10' x 24' SWD.
Each well equipped with a pair of coarse screens 5' x 5' with a 0.1" diameter wire mesh at 3/8" centres.

LOW LIFT PUMPS

Vertical turbine

No. 1 - 2100 GPM @ 25' - 20 HP (3 MGD approximately)

No. 2 - 2100 GPM @ 25' - 20 HP (3 MGD approximately)

No. 3 - 2100 GPM @ 25' - 20 HP (3 MGD approximately)

No. 4 - Provision for a future low lift pump.

Total low lift pumping capacity - 9 MGD.

Pumps are controlled by the level in the clear well in the high lift station and also by the low levels in low lift well.

TREATMENT PLANT

Microstrainer

10' long x 10' diameter.
Equipped with Mark O Fabric having 165,000 openings per sq. in.
Design capacity 4.5 MGD.

CHLORINATION

Two Wallace and Tiernan V-Notch chlorinators.
Type - Series A-731.

HIGH LIFT PUMPS

Horizontal centrifugal.

No. 1 - 2080 GPM @ 254' head - 200 HP (3 MGD approximately)

No. 2 - 1330 GPM @ 254' head - 125 HP (1.9 MGD approximately)

No. 3 - Provision for an extra high lift pump.

No. 4 - 500 GPM @ 210' head - 50 HP (0.7 MGD approximately)

No. 5 - 2080 GPM @ 254' head - 200 HP (3 MGD approximately)

CLEARWELL

Separated into two parts and located below high lift pumps. Capacity of well is 125,000 gallons.

Process Data

GENERAL

The treatment of water at the Bertie Township plant consists of micro-straining to remove algae and gross solids and disinfection by the addition of chlorine.

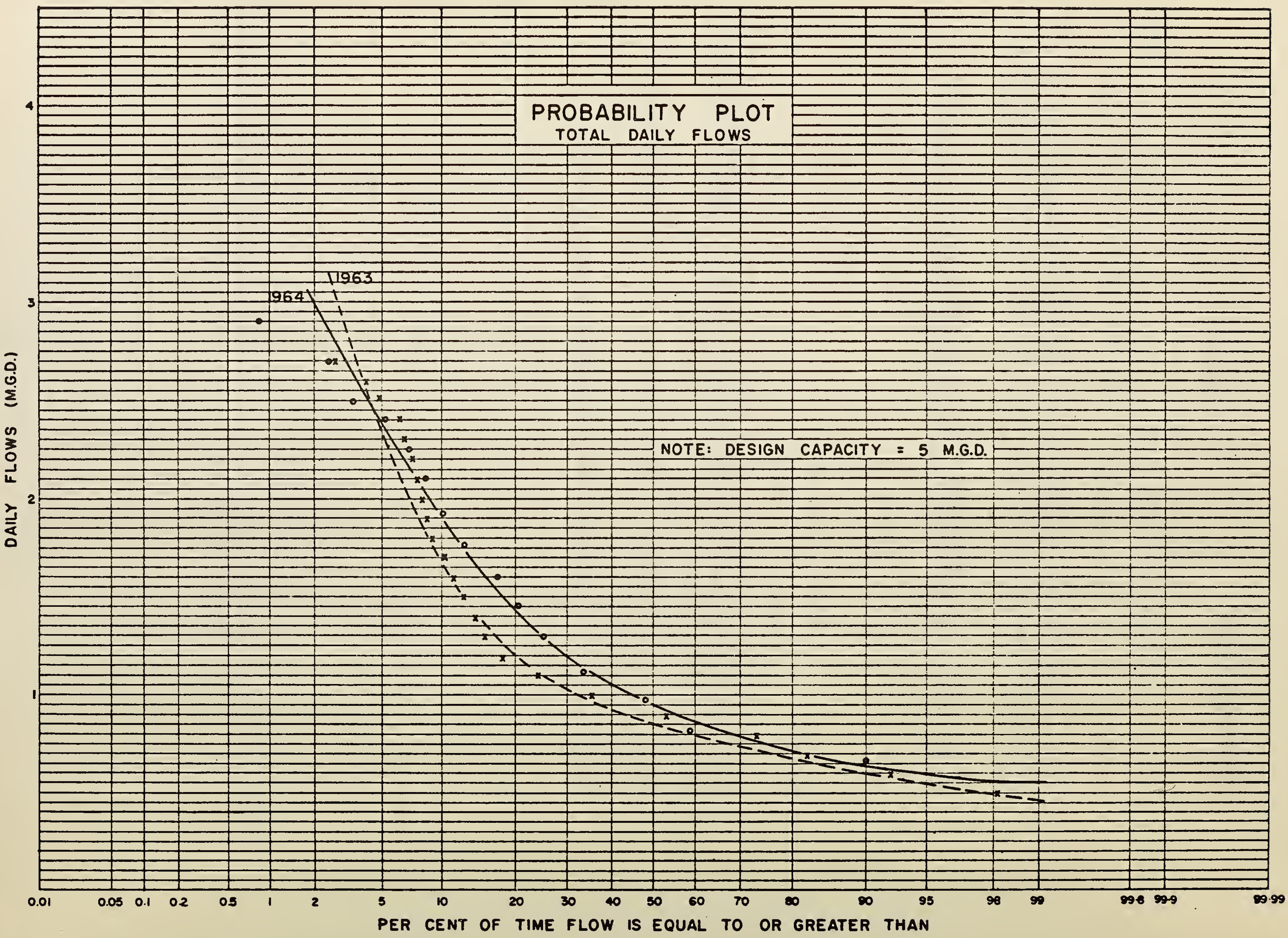
The following data provides information regarding the plant flows, the quality of raw and treated water and the chlorine dosages necessary to maintain safe water.

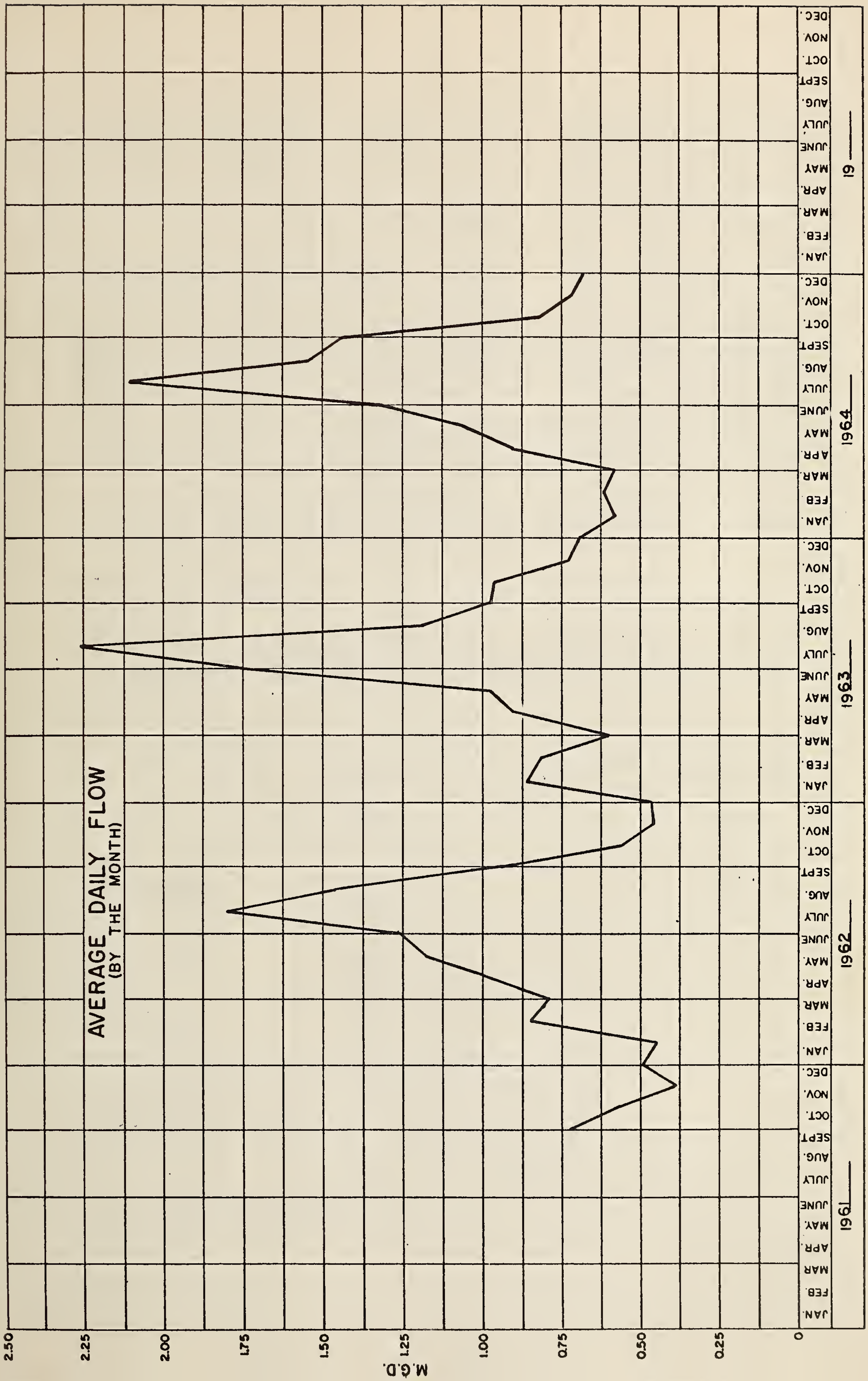
FLOW

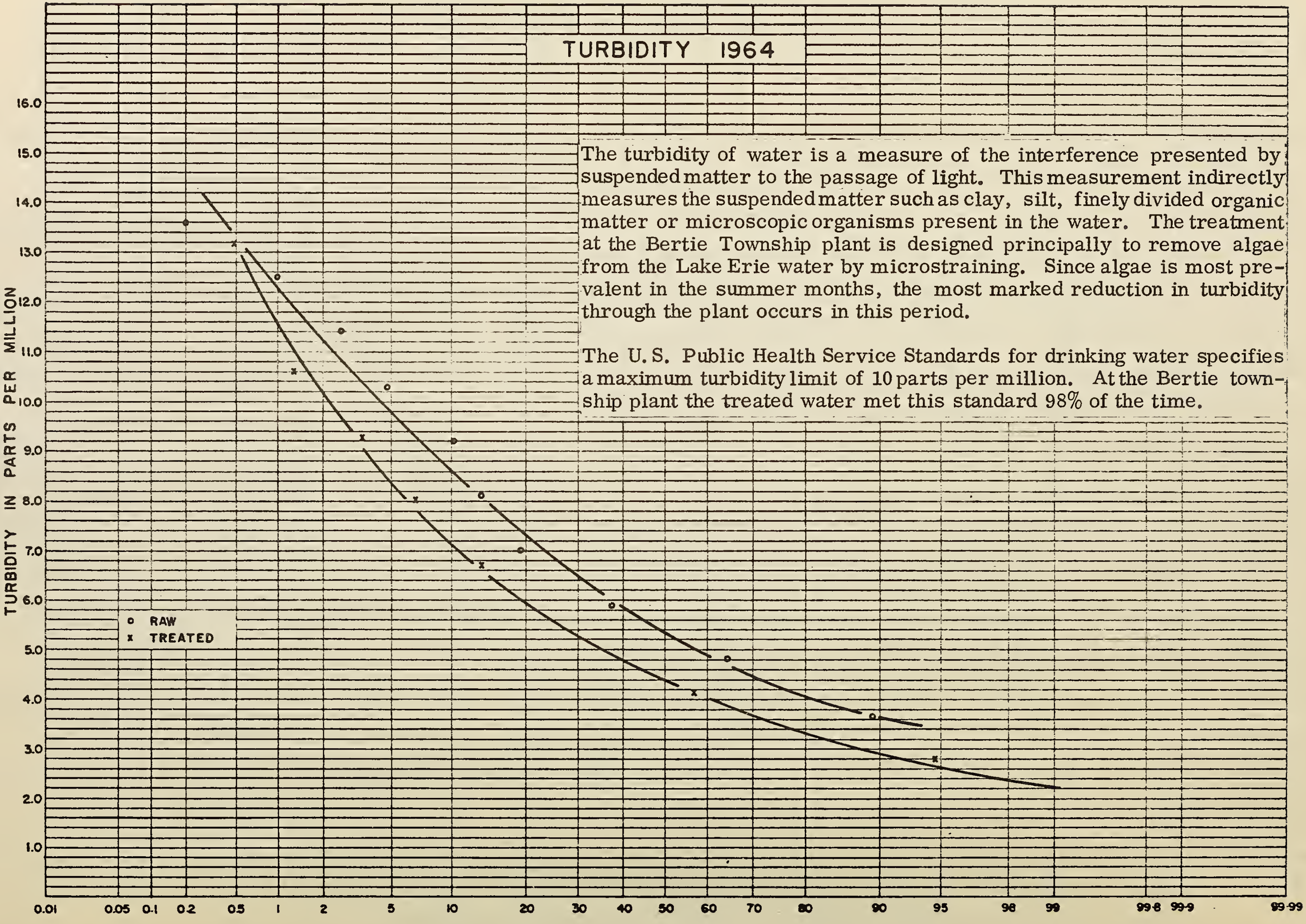
During 1964 a total of 381.524 million gallons of water was supplied by the plant. The average daily flow was 1.042 million gallons and the maximum daily flow which occurred in July was 2.864 million gallons.

The flow meter is operating in the lower part of its range which somewhat limits its accuracy.

The following two graphs summarize the flow data from the treatment plant.


PROBABILITY PLOT
TOTAL DAILY FLOWS
NOTE: DESIGN CAPACITY = 5 M.G.D.
1963
1964
DAILY FLOWS (M.G.D.)
4
3
2
1
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
PER CENT OF TIME FLOW IS EQUAL TO OR GREATER THAN


AVERAGE DAILY FLOW
(BY THE MONTH)
M.G.D.
2.50
2.25
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0
JAN.
FEB.
MAR.
APR.
MAY.
JUNE
JULY
AUG.
SEPT.
OCT.
NOV.
DEC.
1961
1962
1963
1964
19



TURBIDITY 1964

The turbidity of water is a measure of the interference presented by suspended matter to the passage of light. This measurement indirectly measures the suspended matter such as clay, silt, finely divided organic matter or microscopic organisms present in the water. The treatment at the Bertie Township plant is designed principally to remove algae from the Lake Erie water by microstraining. Since algae is most prevalent in the summer months, the most marked reduction in turbidity through the plant occurs in this period.

The U. S. Public Health Service Standards for drinking water specifies a maximum turbidity limit of 10 parts per million. At the Bertie township plant the treated water met this standard 98% of the time.

BACTERIOLOGICAL ANALYSIS

During the year 1964 a total of 95 samples were submitted to the Ontario Water Resources Commission for bacteriological analysis. Of these samples, 24 were of the raw water and 71 were of the treated water. The samples of the treated water were taken at the plant, and in the east, west and north areas of the Bertie Township distribution system. Of the treated water samples, 68 were classified as grade "A" or satisfactory, and 1 was classified as grade "B" where the pollution present is not sufficient to regard the water unfit for drinking. There were 2 samples classified as grade "C" or unsafe for human consumption. Since a close check is kept on the chlorine residual leaving the plant, it is probable that the sampling procedure was at fault in the case of the class "C" results.

CHEMICAL ANALYSIS

During the year samples of the raw water, and treated water in the distribution system were analyzed on five occasions for iron, fluoride and pH. The results are shown in Table 1 along with accepted standards for good quality water.

	IRON*	PH	FLUORIDES*
Raw	0.20	7.9	0.12
East Dist. System	0.17	7.9	0.10
West Dist. System	0.19	7.9	0.12
North Dist. System	0.27	7.9	0.10
Recommended U.S. Public Health Standards	< 0.3	6.7 to 8.5	<1.2 - 1.7

Note: *measured in (ppm)

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (P.P.M)
JANUARY	18.035	189	1.05
FEBRUARY	17.820	158	0.87
MARCH	18.232	224	1.23
APRIL	27.371	216	0.79
MAY	32.051	293	0.91
JUNE	43.699	474	1.08
JULY	64.860	812	1.25
AUGUST	47.767	552	1.16
SEPTEMBER	43.457	466	1.07
OCTOBER	25.307	233	0.92
NOVEMBER	21.418	171	0.80
DECEMBER	21.507	148	0.69
TOTAL	381.524	3936	-
AVERAGE	31.794	328	1.03

COMMENTS

During 1964 the average chlorine dosage to maintain a free residual of 0.3 ppm leaving the plant was 1.03 ppm.

The total chlorine used during the year was 3936 pounds compared to 3676 pounds used in 1963.

CONCLUSIONS

The Bertie Township Water Treatment Plant has provided a good quality water at a reasonable cost during 1964. The plant staff are to be commended for the high standard of work performed at the plant and for the overall high efficiency of the operation.

At the present time there are no major recommendations to be made with respect to the operation of the project although it should be noted that the microstrainer fabric at this plant has outlasted the fabric installed at all other OWRC plants and i

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DIVISION OF PLANT OPERATIONS.
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